

UNITED STATES PATENT OFFICE.

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APPARATUS FOR THE AUTOMATIC PLAYING OF VIOLINS OR OTHER STRINGED
MUSICAL INSTRUMENTS PLAYED WITH BOWS.

Application filed July 6, 1923, Serial No. 649,875, and in France July 8, 1922.

This invention relates to an apparatus for the automatic playing of violins or other stringed musical instruments played with bows, by means of perforated paper rolls or tune sheets.

This apparatus is characterized by the fact that the musical instrument is mounted in a support so as to be able to rock about its longitudinal axis and thus to present to the bow the string or strings upon which the latter is to play, while receiving movements similar to those which are usually communicated to it by the arm of a performer in a direction perpendicular to the longitudinal axis of the instrument, at the same time that keys or stoppers are pressed upon the string or strings at the positions corresponding to the notes to be played, the rocking of the instrument in its support, the longitudinal movements of the bow, and the motion of the keys being controlled by the perforations in the tune sheet corresponding to the piece of music to be played.

The bow is supported by a system of jointed parallelograms, borne by a carriage which travels along a horizontal track, under the action of two connected pneumatic bellows, cylinders or the like, working alternately one as the driver and the other as a brake, and supplied at a pressure which is maintained constant during the whole of their stroke by double pressure regulators.

These double pressure regulators supply the driving and brake bellows or cylinders at differences of pressure which are variable and on one side or the other, regulated by bellows actuated by the perforations in the tune sheet, so as to produce the movements of the bow-carriage at the desired speeds.

The bow is applied to the strings of the instrument with variable pressure, determined by the supply at variable pressure, regulated by the perforations in the tune sheet or at the will of the player, to two pneumatics acting in opposite directions to one another, the bow leaving the string or on the contrary being pressed upon it with suddenly increased force, according as the action of one or other of these two pneumatics is suddenly annulled by placing it in communication with the atmosphere.

The instrument is fixed in a cradle, which rocks around an axis of oscillation, so as to

present to the bow the required string or strings, under the action of bellows controlled by the perforated tune sheet, with means for causing a rapid passage from one position to another.

The device for producing the pressure of the keys or stoppers upon the strings is such that the main parts (the operating bellows, levers, pipes, etc.) do not participate in the movements of the instrument, and that the working of this device does not interfere with the movements of the cradle.

The accompanying drawings represent by way of example, one form of construction of the invention.

Figure 1 is an elevation of the mechanism for supporting the bow.

Figure 2 is an elevation, partly in section and on a larger scale, of a detail of this mechanism,

Figure 3 being a section on line 3—3 of Figure 2.

Figure 4 is a perspective view of a detail.

Figure 5 is an elevation, at right angles to Figure 1, of the bow-supporting mechanism.

Figure 6 is a section on a larger scale of a part of this mechanism, and

Figure 7 is an elevation, also on a larger scale, of another part of the same.

Figure 8 is a diagram explaining the working of the two bellows mounted upon this support.

Figures 9 and 9^a, located side by side, are a general view of the bowing system.

Figure 9^a is a section on a larger scale, of a detail of Figure 9.

Figure 9^b is a separate sectional view of a normal relay valve, as used in the apparatus.

Figures 9^c and 9^d show, in plan view, details of Fig. 9, to a larger scale.

Figures 10 and 10^a are, respectively, a plan view, and a side view, of the tracker bar and perforated sheet arrangement.

Figure 11 is a section of one of the double pressure regulators supplying the bow carriage driving and braking means.

Figure 12 is a plan of the reversing valve controlling the direction of motion of the bow-carriage.

Figures 12^a, 12^b, 12^c are sections of this reversing valve on the lines 12^a—12^a, 12^b—12^b and 12^c—12^c of Figure 12.

Figures 13 and 14 are longitudinal ver-